

[h3] Abstract of the Disclosure

[p83] A silicon germanium heterojunction bipolar transistor device and method comprises a semiconductor region, and a diffusion region in the semiconductor region, wherein the diffusion region is boron-doped, wherein the semiconductor region comprises a carbon dopant therein to minimize boron diffusion, and wherein a combination of an amount of the dopant, an amount of the boron, and a size of the semiconductor region are such that the diffusion region has a sheet resistance of less than approximately 4 Kohms/cm². Also, the diffusion region is boron-doped at a concentration of $1 \times 10^{20}/\text{cm}^3$ to $1 \times 10^{21}/\text{cm}^3$. Additionally, the semiconductor region comprises 5-25 % germanium and 0-3 % carbon. By adding carbon to the semiconductor region, the device achieves an electrostatic discharge robustness, which further causes a tighter distribution of a power-to-failure of the device, and increases a critical thickness and reduces the thermal strain of the semiconductor region.